

CLAIMS

1. A permanent magnet synchronous motor having a stator with a concentrated winding is characterized in that:

5 a relation of  $0.3 Lg < La \leq 2.0 Lg$  is established,

where  $La$  is a clearance between teeth of the stator; and

$Lg$  is an air-gap between the stator and a rotor.

10 2. A permanent magnet synchronous motor having a stator with a concentrated winding is characterized in that:

a relation of  $2 Lg < Lb < 5 Lg$  is established,

where  $Lb$  is a depth of a tooth edge; and

$Lg$  is an air-gap between the stator and a rotor.

15 3. A permanent magnet synchronous motor having a stator with a concentrated winding is characterized in that:

relations of  $0.3 Lg < La \leq 2.0 Lg$ , and  $2 Lg < Lb < 5 Lg$  are established,

where  $La$  is a clearance between teeth of the stator;

$Lb$  is a depth of a tooth edge; and

$Lg$  is an air-gap between the stator and a rotor.

20 4. A permanent magnet synchronous motor having a stator with a concentrated windings is characterized in that:

an edge of at least one end of a tooth of the stator, the edge facing to a rotor, is cut away, and another side edge to the rotor is protruded for maintaining a depth of a tooth end.

25 5. The permanent magnet synchronous motor as defined in claim 1 wherein a permanent magnet in the rotor comprises a ferrite magnet.

6. The permanent magnet synchronous motor as defined in claim 1 wherein the stator comprises a divided core.

5 7. A permanent magnet synchronous motor having a stator with a concentrated winding is characterized in that:

outer walls on both end sections in a rim direction of a permanent magnet disposed inside a rotor along a rotor rim are tapered inward from the rotor rim in a radial direction and form a recessed section.

10 8. The permanent magnet synchronous motor as defined in Claim 7 wherein a relation of  $(1/10)As < Am < (1/4)As$  is established,

where "Am" is an opening angle of a recessed section with regard to a center of the rotor; and

"As" is an opening angle of teeth of the stator.

15 9. The permanent magnet synchronous motor as defined in Claim 7 wherein an inner wall of the permanent magnet facing a radial direction is flat face for increasing a depth of a center section of the permanent magnet in the rim direction.

20 10. The permanent magnet synchronous motor as defined in Claim 7 wherein the permanent magnet is mounted on an outer wall of a rotor core, and a recessed section is formed at an open space from where both the end sections of the permanent magnet are cut away in the rim direction.

25 11. The permanent magnet synchronous motor as defined in Claim 7 wherein the permanent magnet is buried in a rotor core along a rotor-core rim, and a cut-away section is formed at a section corresponding to both the end sections of the permanent magnet in the rim direction.

12. The permanent magnet synchronous motor as defined in Claim 7 wherein the permanent magnet is buried in a rotor core along a rotor-core rim, and a slit is formed at a section corresponding to both the end sections of the permanent magnet in the rim direction.

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13. A permanent magnet synchronous motor having a stator with a concentrated winding is characterized in that:

10 a reversely arced permanent magnet having a curvature-center outside a rotor in a radial direction is buried in a rotor core along a rotor-core rim, and a magnet-end facing to a rotor rim is situated inside the rotor rim in a radial direction, and a slit is formed on the rotor at a section corresponding to the magnet-end.

14. The permanent magnet synchronous motor as defined in Claim 13 wherein a relation of  $Lg < Q < 3 Lg$  is established,

15 where  $Q$  is a distance between the end of the permanent magnet and the rotor-core rim; and

16  $Lg$  is an air-gap between the stator and the rotor.

20 15. The permanent magnet synchronous motor as defined in Claim 13 wherein a relation of  $(1/10)As < Am < (1/4)As$  is established,

25 where "Am" is an opening angle over a width of one of the cut-away section and the slit corresponding to the end of the permanent magnet with regard to a rotor center; and

16 "As" is an opening angle of teeth of the stator.

17. The permanent magnet synchronous motor as defined in Claim 1 wherein said motor is driven in a sensor-less operation

20 25 17. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 1.

18. The permanent magnet synchronous motor as defined in claim 2 wherein a permanent magnet in the rotor comprises a ferrite magnet.

5 19. The permanent magnet synchronous motor as defined in claim 3 wherein a permanent magnet in the rotor comprises a ferrite magnet.

10 20. The permanent magnet synchronous motor as defined in claim 4 wherein a permanent magnet in the rotor comprises a ferrite magnet.

15 21. The permanent magnet synchronous motor as defined in claim 2 wherein the stator comprises a divided core.

22. The permanent magnet synchronous motor as defined in claim 3 wherein the stator comprises a divided core.

23. The permanent magnet synchronous motor as defined in claim 4 wherein the stator comprises a divided core.

24. The permanent magnet synchronous motor as defined in Claim 2 wherein said motor is driven in a sensor-less operation.

25. The permanent magnet synchronous motor as defined in Claim 3 wherein said motor is driven in a sensor-less operation.

26. The permanent magnet synchronous motor as defined in Claim 4 wherein said motor is driven in a sensor-less operation.

27. The permanent magnet synchronous motor as defined in Claim 7 wherein said motor is driven in a sensor-less operation.

28. The permanent magnet synchronous motor as defined in Claim 8 wherein said motor is driven in a sensor-less operation.

5 29. The permanent magnet synchronous motor as defined in Claim 9 wherein said motor is driven in a sensor-less operation.

10 30. The permanent magnet synchronous motor as defined in Claim 10 wherein said motor is driven in a sensor-less operation.

15 31. The permanent magnet synchronous motor as defined in Claim 11 wherein said motor is driven in a sensor-less operation.

32. The permanent magnet synchronous motor as defined in Claim 12 wherein said motor is driven in a sensor-less operation.

20 33. The permanent magnet synchronous motor as defined in Claim 13 wherein said motor is driven in a sensor-less operation.

34. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 2.

25 35. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 3.

36. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 4.

37. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 7.

38. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 8.

5 39. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 9.

10 40. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 10.

15 41. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 11.

42. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 12.

20 43. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 13.

44. A permanent magnet synchronous motor having a stator with a concentrated winding is characterized in that:

25 a reversely arced permanent magnet having a curvature-center outside a rotor in radial direction is buried in a rotor core along a rotor-core rim, and a magnet-end facing to a rotor rim is situated inside the rotor rim in a radial direction, and a slit is formed on the rotor at a section corresponding to the magnet-end.

45. The permanent magnet synchronous motor as defined in Claim 44 wherein a relation of  $L_g < Q < 3 L_g$  is established,

where  $Q$  is a distance between the end of the permanent magnet and the rotor-core rim; and

Lg is an air-gap between the stator and the rotor.

46. The permanent magnet synchronous motor as defined in Claim 44 wherein a relation of  $(1/10)As < Am < (1/4)As$  is established,

5 where "Am" is an opening angle over a width of one of the cut-away section and the slit corresponding to the end of the permanent magnet with regard to a rotor center; and "As" is an opening angle of teeth of the stator.

10 47. The permanent magnet synchronous motor as defined in Claim 44 wherein said motor is driven in a sensor-less operation.

48. A compressor used in one of an air-conditioner and an electric refrigerator driven by the motor as defined in Claim 44.

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